Department of the Army
Pamphlet 5–12

Management

Simulation Support Planning and Plans

Headquarters
Department of the Army
Washington, DC
2 March 2005

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SUMMARY of CHANGE

DA PAM 5-12
Simulation Support Planning and Plans

This new pamphlet, dated 2 March 2005--

- Establishes new procedures for developing, reviewing, coordinating, and approving Simulation Support Plans throughout the publication.

- Recommends a format and content for Simulation Support Plans throughout the publication.

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Simulation Support Planning and Plans

By Order of the Secretary of the Army:

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History. This publication is a new Department of the Army pamphlet.

Summary. This pamphlet provides guidance for simulation support planning, and documenting that planning in simulation support plans, as required by AR 5–11. It also provides guidance on the simulation support plans coordination and approval process and instruction on simulation support plans format and content. This document takes precedence over the Simulation and Modeling for Acquisition, Requirements and Training Planning Guidelines.

Applicability. This pamphlet applies to the Active Army, the Army National Guard of the United States, and the United States Army Reserve. It applies to all activities within the Army acquisition, requirements, and training domains that plan to use or are using models and simulations to achieve Army objectives.

Proponent and exception authority. The proponent of this regulation is the Deputy Under Secretary of the Army for Operations Research. The proponent has the authority to approve exceptions or waivers to this regulation that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief with the proponent agency or its direct reporting unit or field operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this regulation by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal officer. All waivers requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific guidance.

Suggested improvements. Users are invited to submit comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028–E to HQDA (DAMO–SB), 400 Army Pentagon, Washington, DC 20310–0400. Comment on forms may be transmitted electronically to AMSO–SMART@hqda.army.mil.

Distribution. This publication is available in electronic media only and is intended for command levels C and D for the Active Army, the Army National Guard of the United States, and the United States Army Reserve.

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Glossary

Chapter 1
Introduction

1–1. Purpose
This Department of the Army Pamphlet (Pam) provides guidance for simulation support planning and procedures for developing and managing a Simulation Support Plan (SSP) as well as for specifying a standard format for the SSPs. The objective of this pamphlet is to assist all organizations involved in SSP development and review to conform to the SSP policy provisions in Army regulation (AR) 5–11.

1–2. References
Required and related publications and prescribed and referenced forms are listed in appendix A.

1–3. Explanation of abbreviations and terms
Abbreviations and special terms used in this publication are explained in the glossary.

1–4. Overview
Chapters 2 and 3 of this pamphlet provide a general overview of the Simulation and Modeling for Acquisition, Requirements and Training (SMART) concept and the role of SSPs within SMART. Chapter 4 explains the SSP requirement criteria; chapter 5 states the procedures that apply to the SSP development, coordination, review, and approval processes, and delineates the format of an SSP. Chapter 6 defines the SSP content.

Chapter 2
Simulation and Modeling for Acquisition, Requirements and Training

2–1. Simulation-based acquisition
In 1996 the Department of Defense (DOD) began the simulation-based acquisition (SBA) initiative to revolutionize the Defense Acquisition System. The SBA concept is to improve DOD and industry acquisition processes through robust, collaborative use of simulation technology that is integrated across acquisition phases and programs. Since the inception of SBA, defense acquisition system directives have required planning for modeling and simulation (M&S) throughout the acquisition life cycle of systems.

2–2. SMART background
a. SMART Concept. The Army adopted the SMART concept in 1997. The SMART concept takes SBA an extra step by crossing organizational boundaries among the requirements, acquisition, and training communities. The SMART concept encompasses all phases of product development from requirements analysis through materiel production, testing, cost analysis, training, integration, and support; incorporating all functional aspects of the system. Under this concept, M&S is used to reduce software, integration, and human factors risks; test and evaluation duration; and cost. Modeling and simulations are also used to optimize system design, integration, test, and training, and provides a means to measure operations and support cost avoidance. Planning for the application of M&S throughout the life cycle of a system is a key tenet of SMART.

b. SMART leverages M&S. However, SMART involves much more than just the use of M&S. The key to SMART success is the ability to significantly improve and accelerate traditional acquisition processes by linking M&S capabilities with other information-age technologies in an advanced collaborative environment (ACE). Advanced technologies used in concert with M&S are the foundation of the SMART concept. Emerging information-age technologies are revolutionizing our capabilities to collaborate, among all stakeholders, early in the acquisition process and to achieve the full potential of M&S. Early and continuous collaboration leads to more credible total life cycle costing and enables shortened acquisition cycles by "getting it right" before hardware production begins.

c. SMART Planning Guidelines. The SMART Planning Guidelines (SPG) documents all aspects of SMART and serves as a basic reference for this SSP Pam. The SPG is located on the AMSO Web site (http://www.amso.army.mil).

2–3. SMART in acquisition
The use of M&S is a key element of Department of the Defense (DOD) and DA acquisition strategy. Planning for M&S in an interoperable environment throughout the weapon-systems' development cycle is a key tenet of SMART. The SSPs developed using the process and procedures specified in this pamphlet will document the planning and employment of M&S in acquisition programs and the implementation of SMART for systems.

Chapter 3
Simulation Support Planning and Plans

3–1. Purpose of the SSP
The SSP documents the planned and actual use of M&S over the life cycle of a system from concept and technology development to system disposal. It is a document that evolves as the system matures. Because SMART is an enabler to meet Army Transformation objectives, the SSP will discuss how SMART is implemented for the system.

3–2. Planning simulation support
An SSP is a "roadmap" that lays out how M&S supports a concept or technology demonstration or a system's life cycle. The SSP depicts how and when models and simulations are integrated, used, and transitioned over the course of the concept exploration and system development phases, as well as during the sustainment phase. Planning is necessary to answer questions such as: "How do I get there?" "How do I do it?" "When do I do it?" "How much will it cost?" There is no single path to arriving at a successful strategy and plan.

3–3. The SSP documents simulation planning
The SSP is a living document - this means that its content will change as a system matures. The initial SSP provides information about models and simulations used in support of the requirements determination process as well as the early simulation support concept for the proposed program. The SSP for milestone B and beyond provides information about ongoing program simulation support efforts as well as the roadmap for future M&S activities and how they support program capabilities. A good SSP describes past, present, and future M&S efforts, ties them together, and ties them to the program's needs. The SSP should include a record of models and simulations used in development of requirements, analysis of alternatives (AoA), life cycle cost estimation, and other studies. In addition, the combat developer uses the SSP to discuss and define authoritative representations of the system being acquired for use in force-on-force models and simulations. The combat developer should coordinate with the materiel developer in transitioning the preliminary M&S concept and approach for the research, development, and acquisition of a future system.

3–4. The SSP is a planning tool
As a planning tool, the SSP will outline the resources needed to manage and support the use of M&S across the life cycle of the program. It will identify participating organizations, responsibilities, and points of contact (POCs) for program simulation support activities. The SSP accurately records M&S activities undertaken in support of materiel requirements determination, program acquisition, and development of tactics, techniques and procedures (TTPs) and training support packages (TSPs). The SSP must also discuss coordination with other organizations and planned future M&S activities. Communicating and documenting the thought processes inherent in simulation support planning are critical products of SMART. This rationale will be discussed as a part of the crosswalk that links program capabilities with planned use of specific models and simulations. The SSP should also demonstrate the payoff of applying those models and simulations to the acquisition process (for example, cost avoidance, time savings, and risk reduction).

Chapter 4
Simulation Support Plan Requirement

4–1. Programs that require SSPs
Army regulation 5–11 requires SSPs for Army acquisition programs. (Refer to DODI 5000.2, enclosure 2 for definitions of acquisition categories.) The following Army programs must have SSPs:

a. Acquisition Category (ACAT) I and ACAT II programs.

b. Programs on the Director, Operational Test and Evaluation (DOT&E) Test and Evaluation Oversight List. (DODI 5000.2 enclosure 5)

c. Advanced Technology Demonstrations (ATD).

4–2. Programs that do not require SSPs
The following Army programs do not require SSPs:

a. Small item ACAT III materiel programs. This includes small items such as holsters, kneepads, handcuffs, battlefield showers, medical vaccines, food sanitation centers, pistol mount interfaces, and so forth.

b. Non-developmental item (NDI) ACAT III programs. This includes programs that are commercial off-the-shelf (COTS) products developed by industry that do not require significant modification to meet warfighter requirements.

4–3. Other programs that require SSPs
All other Army programs, including programs that are beyond milestone C and programs purchasing products that were

once Army developmental programs, need SSPs subject to certain criteria discussed in paragraph 4–4, below. This includes the following:

a. ACAT III training aids, devices, simulators and simulations (TADSS); models and simulations; and automated information systems.

b. Army-led advanced concept technology demonstrations (ACTDs) that utilize M&S.

c. Science and technology objective (STO). A STO may need a SSP to describe how M&S will be used in the STO. The SSP may be abbreviated based on answers to the Discussion/Checklist in chapter 6.

4–4. SSP requirement criteria

The criteria for determining whether a SSP is required for a program that falls under the scope of paragraph 4–3, above, are as follows:

a. Programs that use or plan to use M&S in support of the program must have a SSP.

b. Programs that have not considered the use of M&S activities will base the need for a SSP on the results of a review of this Pam.

c. Programs for which digital representations of the system are required must have a SSP.

Chapter 5
Simulation Support Plan Development and Approval

5–1. SSP development

a. Duties. The SSP Proponent develops, maintains, implements, and updates the SSP. The combat developer proponent is considered to be the SSP Proponent during the pre-systems acquisition phase of the acquisition process. For new systems that require an SSP, the combat developer proponent leads the Integrated Concept Team (ICT) that is responsible for developing the initial SSP. The ICT should provide the SSP to the program manager (PM) when one is appointed, at which time the PM becomes the SSP Proponent. The PM should review the SSP for consistency with the program acquisition strategy, Test and Evaluation Master Plan (TEMP), the System MANPRINT Management Plan (SMMP), and System Training Plan (STRAP). The ATD/ACTD/STO manager is the SSP Proponent for an ATD/ACTD/STO project/program.

b. Development. For a PM, the content and format of the SSP should be as outlined in this PAM. The preferred method for a PM to develop and/or update the SSP is through an M&S Integrated Product Team (IPT) comprised of representatives from Army agencies that are key stakeholders for the system being developed. The SPG contains detailed guidance on developing and implementing an SSP.

c. Format. Figure 5–1 provides a SSP format. Chapter 6 describes the desired content for each recommended chapter of the SSP. The SSPs are living documents. As such, they should be revised as the program progresses. While the initial SSP will not be as detailed as later revisions, the SSP should provide a level of detail appropriate to the system's developmental maturity.

Title page

Approval and coordination summary

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Figure 5–1. SSP format

5–2. SSP coordination

A key activity of simulation support planning is coordination. The SSP Proponent should coordinate the SSP among the organizations that are involved in the development, testing, support, and use of the system, or that will provide input to or use output of program-related models or simulations. These key stakeholder organizations should have already collaborated in the development of the SSP through the ICT or M&S IPT. The SSP Proponent should coordinate the SSP with the contractor, once a contract is awarded. The SSP Proponent should minimize duplicate M&S applications and costs between the government and the contractor.

5–3. SSP review

a. Peer reviews. Combat Developers or PMs who have drafted SSPs and are at least six months from capability document validation/approval, system reviews, or milestone decision reviews, are encouraged to participate in the Army SSP peer review process. The SSP Proponents who wish to participate in a peer review process should contact their appropriate M&S domain manager or Army modeling simulation office (AMSO) to coordinate peer reviews.

b. ATD SSP review. The ATD Manager will submit the draft SSP with the draft ATD Management Plan to AMSO for review and comment prior to submitting the ATD Management Plan for formal approval. The AMSO will review the SSP with appropriate organizations and provide comments back to the ATD manager.

c. Requirements validation reviews. The current SSP will accompany the capability document (CD) (CD - refers to either the CDD or the CPD) when the combat developer submits the CD to HQ TRADOC for CD validation. The HQ, TRADOC will include the Requirements Integration Working Group (RIWG) during the requirement validation process. (Additional information on the RIWG is available at http://www.amso.army.mil.)

d. Program reviews. The SSP Proponent should provide the SSP to AMSO prior to program reviews. The AMSO will evaluate the SSP at these times and provide comments/recommendations to the SSP Proponent within 30 days. If there appear to be deficiencies in the SSP, AMSO will assist the SSP Proponent in correcting the deficiencies by recommending subject matter experts (SME) to review it and provide comments/recommendations to correct the deficiencies. If there are sections that would benefit others in the M&S community, the AMSO will provide that information to the RIWG for dissemination to the M&S community.

5–4. SSP approval

The SSP Proponent signs and approves the SSP. The planning and M&S strategy contained in the SSP are approved for implementation as part of the program acquisition strategy.

Chapter 6
Simulation Support Plan Content

6–1. Title page

The title page must include the name of the program, ACAT level, milestone status, name of the organization, address, date, and distribution statement.

6–2. Approval and coordination summary

The approval and coordination summary page must include “prepared by” contact information and appropriate approval authority signature. This page must also include a coordination summary including the names of organizations with which the SSP has been coordinated (see para 5–3).

6–3. Table of contents

A table of contents must be included.

6–4. Purpose

The purpose is intended to provide a concise statement of the scope (combat development or materiel development issues to be discussed) and objectives. The purpose must be a maximum of one paragraph.

6–5. Executive summary

The executive summary is intended to provide a synopsis of the SSP. The executive summary must be no more than one page.

6–6. System description overview

The system description provides a concise, top-level description of the materiel system. The program’s milestone

status, acquisition phase, and ACAT level are included here. The system description overview must be no more than two pages and can refer to other program documentation such as the capability development document (CDD).

6–7. System acquisition strategy

This section provides a description of the program history or materiel system acquisition strategy. A timeline showing the overall acquisition schedule, current phase, current and future milestones, and special events will be included. The PM must determine the most effective way to implement SMART and develop an acquisition strategy that will derive the expected benefits associated with the SMART concept. The SMART planning includes both developing an M&S strategy that is an interconnected part of the overall acquisition strategy for a system and documenting the M&S strategy in the SSP. This will ensure that combat developers have thought through the benefits, costs, opportunities, and schedule considerations associated with the use of M&S. Where applicable, a link will be drawn between related developmental or current systems in the Army inventory (systems in the same Program Executive Office (PEO) or systems that will operationally link through a common deployment). This is important in order to show how the use of M&S can be leveraged and how M&S can be reused not only within a specific program but also among different programs.

6–8. Model and simulation support approach

This section provides information on the M&S strategy, life cycle use of M&S, the CD crosswalk to M&S, and interoperability. Refer to the SPG for additional information in these areas.

a. M&S strategy. The M&S strategy is the heart of the SSP. The SSP Proponent describes how models and simulations are and will be used to support the current acquisition phase and the life cycle of the system. The M&S strategy may evolve as the program and the related system mature and will include the history of model and simulation use in past phases of the program and system life cycle. An M&S schedule should be included and its relationship to the acquisition program schedule will be clearly described and illustrated. The M&S strategy should address how models and simulations are used to identify, analyze, and mitigate program-related risks. This sub-section should be very specific to the program needs and not reiterate general SSP or SMART policy/guidance.

b. Life cycle use of M&S. This sub-section includes a general discussion/checklist of how M&S will be used during the life cycle of a system. Although the checklist in figure 6–1 is not all-inclusive, it is intended to help the SSP Proponent think through some of the issues that should be documented in the SSP. Categories not considered relevant to an individual system should be expressly noted in the SSP. Each of the models and simulations documented in appendix D of the SSP should be related to these life cycle phases/factors. Planned evolution of each of these models and simulations should be related to the life cycle phases. Reuse of models and simulations must be identified throughout a program's life cycle and in other programs. verification, validation and accreditation (VV&A) for combined use (multiple models or simulations interacting) of models and/or simulations in appendix D must be discussed, and any additional VV&A requirements identified. VV&A must adhere to DA Pam 5–11.

Category	Discussion/Checklist
Combat Development	• What M&S is being performed by battle labs? • What live, virtual, and constructive (LVC) simulations are being used to support combat development? • How can design and engineering M&S efforts for a current and future program provide authoritative representations of a system for combat development M&S efforts?
Design and Engineering	The program should take full advantage of M&S technologies to assist in the design and engineering of the system. • How will commercial M&S tools be utilized in the Systems Engineering effort? • How will design constraints or boundaries be integrated into M&S tools to support trade-off analyses? • How will M&S tools be used to integrate existing data and data sources with systems engineering efforts? • How will previous commercial and/or defense data be used in M&S efforts to reduce design, engineering and test costs? • What Computer Aided Design/Computer Aided Manufacturing (CAD/CAM) tools are being employed and how are the virtual designs linked to M&S tools addressing system effectiveness, cost estimates, supportability requirements, and operational effectiveness? • How are CAD/CAM tools integrated with other M&S tools to allow trade-off analysis? • How are digital representations of the CAD/CAM system designs used to provide system representations for use in Army force-on-force simulations?
Manufacturability	The program should take full advantage of M&S technologies to assist in the manufacturing of the system. • Are there design changes that would improve the manufacturing process? • Is the production line designed with M&S to optimize the manufacturing process? • Is the developer required to model manufacturability? • Which manufacturing decisions does the M&S support?
Logistics and Support	M&S addressing the supportability of Army equipment, ranging from weapon systems to support equipment. • Has total cost of ownership, including sustainment, been programmed through the life cycle? • What types of M&S (LVC) will provide insight into logistics and support? • How will M&S tools be used to define logistics support requirements, i.e., FMECA, LORA, etc.? • How will M&S tools be used in making cost, schedule and performance tradeoffs as they relate to enhancing deployment, enhancing reliability, reducing logistics footprint and reducing logistics costs? • How will M&S tools be used to determine the optimum support structure? • What type of M&S will to used to identify an optimum support structure for the system (e.g., the standard Army model level of repair analysis model, COMPASS)? • How will M&S tools be used to enhance the man-machine

Figure 6–1A. Life cycle use of M&S checklist

Category	Discussion/Checklist
	interface (MANPRINT)? • What other systems, models and simulations will logistics models and simulations need to interact with? • What type of M&S can be used to train operators on sustainment and maintenance of the system? • How can M&S be used to enhance operator and/or maintenance training? • Will embedded M&S support logistics, sustainment, and maintenance of the system? • Will M&S tools be embedded within the system to enhance product support, training, or sustainment engineering? • Does the M&S provide insight into life cycle costs? • How will M&S tools be used to determine the optimum product support system? • What type of M&S may be used to assist with post fielding assessment analysis? • Are there proponents for logistics and support that are part of an ICT/IPT collaborative environment that are defining and contributing to the system distributed product description? • Have Physics of Failure (PoF) models been incorporated into the distributed product description?
Test and Evaluation	Test and Evaluation (T&E) are key areas for the advantageous use of M&S. • Has a "model-test-model" process been set up or defined? • Has the SSP been crosswalked with the TEMP? • How does M&S assist in carrying out the system's test and evaluation program in each functional area and phase? • How will M&S be used to represent the expected Operational Environment? • Is M&S used to facilitate developmental testing? • Is M&S used to facilitate operational testing? • How willl M&S be used to verify interoperability requirements? • How is M&S used to facilitate live fire test and evaluation? • Is the use of M&S in test and evaluation cost and time effective? • If appropriate, is the Simulation Test and Evaluation Program (STEP) process used in developing the strategy for test and evaluation? • Have the models and simulations used for T&E been considered for use in Training for the system?
Training (embedded, stand-alone, and system-of-systems trainers)	Training is the ability to improve the level of learning and performance transfer required to perform the responsibilities assigned to the function, and accomplish the mission assigned to the system. • Will M&S be used for initial development of training support products to be incorporated into the Training Support System? • Does the life cycle strategy include the development and sustainment of Training Support Packages (TSPs)? • Has the SSP been crosswalked with the STRAP? • Are training capabilities embedded in the system? • Are simulations, simulators, and stimulators incorporated for

Figure 6–1B. Life cycle use of M&S checklist - continued

Category	Discussion/Checklist
	individual; crew; unit; collective; battle staff; Joint, Interagency, Intergovernmental, and Multinational (JIIM); and Special Operations Forces (SOF) training? • Can system capabilities be incorporated into virtual and constructive M&S for training? • Can LVC M&S be integrated and networked for training, supporting the seamless LVC-Training Environment? • Are synthetic environments used to support training? • What efficiencies can M&S give in the training functional area? • Are training devices reusable in other functional areas or non-system-specific training devices? • Are the T&E M&S tools reusable for training? • What M&S tools are being used for training throughout the system's life cycle?
Analysis/AoA	• How will M&S tools be used in making cost, schedule, performance and supportability tradeoffs? • What were the assumptions for representations used in the AoA? • What Army M&S analytical tools were used in support of the analysis? • Who has the data and results for these efforts? • What representations of the system are required for future analysis or combat development purposes? • Are these requirements in the system CD?
Life Cycle Cost/Operation & Support	The objective is to create a cost culture by participation in a collaborative environment of cost, acquisition, requirements, and training. Cost tools must interface with engineering & requirements tools to support the Cost as an Independent Variable (CAIV) concept. • How will M&S tools be used in evaluating total ownership cost or life cycle cost over the system's life cycle? • What type of M&S will be used to estimate total cost of ownership for the system (e.g., CASA life cycle cost model)? • What M&S cost tools are being used to estimate the life cycle cost of a system? • Is the standard Army cost model, Automated Cost Estimating Integrated Tool (ACEIT), being used? • Are the cost M&S tools linked with engineering design tools? • What design trade-off analysis M&S tools are being used? • What software cost estimating M&S tools are being used? • What M&S tools are being used for Operation & Support cost estimating?
Advanced Collaborative Environment	The ACE, a basic tenet of SMART, allows M&S users to exchange and use information pertaining to concept or system development through an Integrated Data Environment supported by effective processes and management to ensure collaboration between the many stakeholders. • How will the different M&S efforts be integrated to support the ACE? • Does the ACE utilize suitable and industry standard collaborative technologies? • Which M&S tools are integrated in the ACE? • What management processes exist to facilitate trade-off analysis and stakeholder feedback?

Figure 6–1C. Life cycle use of M&S checklist - continued

Category	Discussion/Checklist
Threat	• Has the SSP been crosswalked with the System Threat Assessment Report (STAR)? • How are threat systems represented? • What are the assumptions for future threat representations? • Is the portrayed threat Defense Planning Guidance Illustrative Planning Scenario compliant and derived from an approved MSFD [Multi-Service Force Deployment] order of battle? • Are the deployment and employment of simulated threat systems in consonance with OE principles outlined in TRADOC Pam 525-60 (Operational Environment)? • Have all signficant variables in the OE been accounted for as they relate to BLUE system's employment ? • Were threat representations appropriately verified and validated by the appropriate Army and DoD agencies? • Have appropriate resource repositories been checked for existing threat representations?
Reliability, Availability and Maintainability	Reliability is the probability that a device or system will perform its prescribed duty without failure for a given time when operated correctly in a specified environment. Availability is an index of effectiveness that allows answering: Is equipment available in working condition when needed? Maintainability is defined as an inherent characteristic of a finished design that determines the type and amount of maintenance required to retain that design in, or restore it to, a specified condition. • Is the use of M&S to assess/enhance system reliability, availability and maintainability addressed? • How is M&S used to identify methods to minimize maintenance efforts? • Are decisions that are supported by M&S identified?
Survivability & Lethality	Survivability is defined as the capability of a system to avoid or withstand man-made hostile environments without suffering an abortive impairment of its ability to accomplish its designated mission. Lethality is defined as the ability of a weapon system to inflict damage that will cause the loss or degradation in the ability of a target system to complete its designated mission(s). • How is M&S used to address issues related to system survivability in each functional area and acquisition phase? • How is M&S used to enhance survivability of the weapon system in each functional area and acquisition phase? • How is M&S used to enhance the lethality of the weapon system or its ability to efficiently perform its mission? • Which lethality models are used?

Figure 6–1D. Life cycle use of M&S checklist - continued

c. Capabilities document crosswalk to M&S. A CD crosswalk with models and simulations is the foundation of a good SSP. A crosswalk should track the requirements at a level of detail sufficient to indicate that there is a workable plan, with known models and simulations (or with models and simulations that must be developed) that can be applied to address key program requirements and issues.

(1) The materiel developer must identify how M&S answers questions about and supports solutions to approved program requirements. The M&S strategy describes how selected models and simulations will be applied and the rationale for their use. This sub-section also should note deficiencies in existing models and simulations that will not meet the needs of the program. Such information is used by the M&S domains to develop Domain Evolution Plans and domain investment strategies.

(2) Appendix D to the SSP provides the details on the listed models and simulations, showing origin, VV&A status,

availability, prior applications, and points of contact. The name, description, characteristics, and applications for each selected model and simulation should be provided. A number of programs have effectively used referenced tables with this information in their SSPs. The SPG has example(s) of CD - M&S crosswalks.

d. Interoperability. This sub-section must explain how interoperability of models and simulations is achieved within the system, service, and other DOD components. Interoperability is a key performance parameter of many programs. If a model or simulation is required to be interoperable with other DOD systems, an assessment of how this is to be achieved must be included. High level architecture (HLA) compliance must be detailed, as well as any interoperability requirements for command, control, communications, computers, and intelligence (C4I).

6–9. Authoritative system representation

a. Authority and distribution. An authoritative system representation (ASR) is the description of a system's performance and behavior and its interaction with the environment. This section will also provide information and procedures for obtaining ASR data. The PM approves the ASR and is responsible for maintaining and updating it. Upon request, the PM will provide the ASR to other organizations that represent the system in models or simulations. These organizations will use the ASR as a specification for building composable models of the system. How the organizations implement the ASR will not be constrained.

b. Description and documentation. The ASR will describe the system requirements and capabilities in a standard manner to facilitate model and simulation reuse. The ASR can be described in a text document, spreadsheet, or distributed product descriptions (DPD) as appropriate to the system. The ASR should address certain areas to ensure that a complete and consistent system specification is identified for the modeler. These common areas are critical to accurately model the system's performance and behavior and its interaction with the environment. The following areas should be described for the system, as appropriate: physical characteristics; reliability, availability, and maintainability; survivability; lethality; behavior; and expected interaction with the threat, terrain and weather. The PM will ensure that the ASR is based on data and products provided by the responsible authoritative data source agency in accordance with applicable DOD and Army regulations. Estimated data in the ASR will be replaced with actual data as the system matures. As this occurs, the PM will maintain complete documentation of the sources and methods of acquiring the actual system data, to support accreditation of the ASR for use. For a more detailed description of the ASR, refer to the SPG.

6–10. M&S resource management

This section provides information regarding how the program manages its use of M&S resources. The use of M&S in program management is discussed in section 7 of the SSP. Refer to the SPG for additional information in these areas.

a. M&S management organization. The M&S management organization will be a subset of the program management organization. This sub-section provides information and identifies circumstances that may impact the management of the program's M&S activities, and provides wiring diagram(s) that identify key personnel by areas of responsibility, and relationships with other government and program management organizations and other program IPTs and teams.

(1) Are key personnel identified?

(2) Are M&S areas in which contractors will work identified?

(3) Is an ICT or IPT with representation from each functional area identified?

(4) Are circumstances that may impact M&S management included?

b. Resources and cost. "Resources" identifies M&S-related resource requirements and responsibilities to include funding required for development and management of models and simulations, facilities, equipment, and services and schedule. Refer to the SPG for more information in this area.

(1) What models are used to estimate life cycle costs? to track costs?

(2) What analysis models are used to identify cost effective alternatives for requirements?

(3) Are cost estimates validated by an independent agency?

(4) What models are used to estimate schedule? to manage each M&S application?

(5) Are M&S resources, such as equipment, services, facilities, and so forth, identified?

(6) Which engineering economics tools are used to manage M&S software developments?

c. Data sources. Describes how external data sources will be managed to meet program objectives. Refer to the SPG for more information in this area.

(1) What are the sources of the data, algorithms, and object representations?

(a) Are they credible?

(b) Are they authoritative?

(c) Are they validated?

(d) Are they certified?

(2) Is data reuse appropriate?

(3) How will data be used?

(4) Do the data meet DOD and Army standards?

(5) Are the environmental data in the format needed for the selected simulation?
(6) Who will use the data generated by M&S tools?

6–11. Appendices

Appendices will be included as follows:

a. Appendix A. References.
b. Appendix B. Acronyms.
c. Appendix C. Definitions.
d. Appendix D. Descriptions of Models, Simulations & Other Simulation Support Tools.
e. The selected models and simulations includes the following:
(1) Model name(s).
(2) Model description(s).
(3) Model proponent/owner.
(4) Model characteristic(s) (for example live, virtual, constructive) .
(5) Model applications to this SSP.
(6) Level of fidelity (as appropriate).
(7) HLA compliance.
(8) VV&A status and prior activities.
(9) Related M&S activities.
(10) Data support (requirements, sources and certification).

Appendix A
References

Section I
Required Publications

AR 5–11
Management of Army Models and Simulation. (Cited in paras 1–1 and 4–1.)

DA Pam 5–11
Verification, Validation, and Accreditation of Army Models and Simulations. (Cited in para 6–8*b*.)

Section II
Related Publications
A related publication is merely additional information. The user does not have to read it to understand the publication.

AMSO Publication
SMART Execution Plan (Available at www.amso.army.mil.)

AMSO Publication
SMART Planning Guidelines (Available at www.amso.army.mil.)

AR 70–1
Army Acquisition Policy

AR 350–38
Training Device Policies and Management

DA Pam 70–3
Army Acquisition Procedures

DOD 5000.59–P
DOD Modeling and Simulation (M&S) Master Plan (Available at http://www.dtic.mil/whs/directives.)

DODD 5000.1
The Defense Acquisition System. (Available at http://www.dtic.mil/whs/directives.)

DODD 5000.59
DOD Modeling and Simulation (M&S) Management (Available at http://www.dtic.mil/whs/directives.)

DODI 5000.2
Operation of the Defense Acquisition System (Available at http://www.dtic.mil/whs/directives.)

DODI 5000.61
DOD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A) (Available at http://www.dtic.mil/whs/directives.)

DOD VV&A Recommended Practices Guide
(Available at http://vva.dmso.mil.)

Interim Defense Acquisition Guidebook
Non-mandatory guidance on best practices, lessons learned, and expectations (Available at http://dod5000.dau.mil.)

Section III
Prescribed Forms
This section contains no entries.

Section IV
Referenced Forms
This section contains no entries.

Glossary

Section I
Abbreviations

ACAT
acquisition category

ACE
advanced collaborative environment

ACEIT
automatic cost estimating integrated tool

ACR
advanced concepts and requirements

ACTD
advanced concept technology demonstrations

AMSO
Army model and simulation office

AoA
analysis of alternatives

AR
Army regulation

AROC
Army Requirements Oversight Council

ASTAG
Army Science and Technology Advisory Group

ATD
advanced technology demonstration

CAD
computer aided design

CAIV
cost as an independent variable

CAM
computer aided manufacturing

CD
capability document

CDD
capability development document

CE
collaborative environment

COTS
commercial off-the-shelf

CPD
capability production document

CTD
concept and technology development

C4I
command, control, communications, computers, and intelligence

DA
Department of the Army

DOD
Department of Defense

DOT&E
Director, Operational, Test, and Evaluation

DPD
distributed product descriptions

DOTMLPF
Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities

DUSA(OR)
Deputy Under Secretary of the Army for Operations Research

GOTS
government off-the-shelf

HLA
high level architecture

HQ
Headquarters

ICD
initial capabilities document

ICT
Integrated Concept Team

IPT
Integrated Product Team

JIIM
joint, interagency, intergovernmental, and multinational

LVC
live, virtual, constructive models and simulations

M&S
modeling and simulation

NDI
non-developmental item

NGB
National Guard Bureau

ORD
operational requirements document

Pam
pamphlet

PEO
Program Executive Office

PM
program manager

PoF
physics of failure

RDA
research, development, and acquisition

RIWG
Requirements Integration Working Group

SAF
semi-automated forces

SBA
simulation-based acquisition

SMART
Simulation and Modeling for Acquisition, Requirements and Training

SME
subject matter experts

SOF
Special Operations Forces

SPG
SMART planning guidelines

SSP
Simulation Support Plan

STAR
System Threat Assessment Report

STEP
Simulation Test and Evaluation Program

STO
science and technology objectives

STRAP
System Training Plan

TADSS
training aids, devices, simulators and simulations

TEMO
training, exercises and military operations

TEMP
Test and Evaluation Master Plan

TRADOC
Training and Doctrine Command

T&E
test and evaluation

V&V
verification and validation

VV&A
verification, validation, and accreditation

Section II
Terms

Accreditation
The official certification that a model or simulation is acceptable for use for a specific purpose.

Advanced Collaborative Environment (ACE)
Within the context of SMART, an advanced collaborative environment (ACE) is an enduring collection of subject matter experts (SMEs) supported by interoperable tools and databases, authoritative information resources, and product/process models that are focused on a common domain or set of problems.

Advanced concepts and requirements (ACR) domain
One of the three domains for Army M&S applications, ACR includes experiments with new concepts and advanced technologies to develop requirements in doctrine, training, leader development, organizations, materiel and soldiers that will better prepare the Army for future operations. ACR evaluates the impact of horizontal technology integration through simulation and experimentation using real soldiers in real units.

Analysis of alternatives (AoA)
A study conducted to provide support for acquisition decisions in the acquisition cycle. The AoA illuminates the relative advantages and disadvantages of the alternatives being considered showing the sensitivity of each alternative to possible changes in key assumptions,(for example, threat) or variables (for example, performance capabilities). There shall be a clear linkage between the AoA, system requirements, and system evaluation measures of effectiveness.

Authoritative system representation (ASR)
A description of a system's performance and behavior and its interaction with the environment.

Distributed product descriptions (DPDs)
A distributed collection of product-centric information that is interconnected via web technology into what appears (to the user) to be a single, logically unified product representation. The DPDs are composed primarily of three types of information: product data, product models, and process models. Product data specifies the characteristics of a product at any point in its development cycle, including requirements, program management data, cost data, engineering data, manufacturing data, and test data. Product models are authoritative representations of a product's behavior and/or performance. Process models are used to define the business operations necessary to define, develop, manufacture, deploy, and dispose of the product throughout its life cycle. The DPDs may also contain other relevant product-related information, such as functional descriptions of product behavior and various categories of applicable metadata (for example, VV&A status).

High level architecture (HLA)
Major functional elements, interfaces, and design rules, pertaining, as feasible, to all DOD simulation applications, and providing a common framework within which specific system architectures can be defined.

Integrated Concept Team (ICT)
An integrated team made up of representatives from multiple disciplines formed for the purposes of developing operational concepts, developing materiel requirements documents, developing other DOTLMPF requirements documents, when desired, and resolving other requirements.

Integrated Product Team (IPT)
A working-level team of representatives from all appropriate functional disciplines working together to build successful and balanced programs, identify and resolve issues, and provide recommendations to facilitate sound and timely

decisions. An IPT may include members from both Government and industry, including program contractors and subcontractors. Mandatory procedures for IPTs in the oversight and review process are described in the Defense Acquisition Guidebook (formerly the DOD 5000.2R), available at http://dod5000.dau.mil.

Live, virtual, and constructive simulation
The categorization of simulation into live, virtual, and constructive is problematic, because there is no clear division between these categories. The degree of human participation in the simulation is infinitely variable, as is the degree of equipment realism. This categorization of simulations also suffers by excluding a category for simulated people working real equipment (for example, smart vehicles).

a. Live simulation. A simulation involving real people operating real systems.

b. Virtual simulation. A simulation involving real people operating simulated systems. Virtual simulations inject human-in-the-loop in a central role by exercising motor control skills (for example, flying an airplane), decision skills (for example, committing fire control resources to action), or communication skills (for example, as members of a C4I team).

c. Constructive model or simulation. Models and simulations that involve simulated people operating simulated systems. Real people stimulate (make inputs) to such simulations, but are not involved in determining the outcomes.

Modeling and simulation
The development and use of live, virtual, and constructive models including simulators, stimulators, emulators, and prototypes to investigate, understand, or provide experiential stimulus to either (1) conceptual systems that do not exist or (2) real life systems which cannot accept experimentation or observation because of resource, range, security, or safety limitations. This investigation and understanding in a synthetic environment will support decisions in the domains of research, development, and acquisition (RDA) and advanced concepts and requirements (ACR), or transfer necessary experiential effects in the training, exercises, and military operations (TEMO) domain.

Process models
A depiction of the processes and activities relevant to operating an enterprise. For instance, the specification of design processes is necessary to fully define the systems engineering approach to be used to iterate and mature the product design over multiple cycles. The specification of manufacturing processes is necessary to define the low-level procedures needed to fabricate and assemble a product and also to enable the identification of appropriate aggregations of these low-level sub-processes that together specify the overall flow of control on the factory floor. Process models for test and evaluation (for example, STEP), operational support, VV&A, and standard business practices are also necessary to fully define an enterprise. A wide range of tools may apply these process models for the purpose of optimization and implementation.

Product data
Any information that describes the current state of a product specification at any point in the systems acquisition process. This would include requirements data, engineering data, cost data, manufacturing data, logistics data, and whatever other types of data are required to fully define the product. This information is captured and made globally and instantly accessible to all members of distributed IPTs via DPDs.

Product models
Authoritative representations of product behavior and performance. Each product model identified in a DPD can reference an actual software implementation of the product (data and methods) that has been developed to operate in a specific static analysis tool or dynamic virtual environment. For instance, a single DPD for a radar system might reference several different product models, each of which is intended for use in different simulation systems. Alternatively, product behavior may also be represented via appropriate algorithms, which have not been implemented in software. Each product model is based on a common functional and operational description (included in the DPD) that provides the basis for verification and validation of the model. The results of V&V testing and the level of sponsor accreditation currently associated with the model are additional categories of product data included in a DPD.

Research, development, and acquisition (RDA) domain
One of the three domains for Army M&S applications. The RDA domain includes all models and simulations used for design, development, and acquisition of weapons systems and equipment. Models and simulations in the RDA domain are used for scientific inquiry to discover or revise facts and theories of phenomena, followed by transformation of these discoveries into physical representations. RDA also includes test and evaluation (T&E) where models and simulations are used to augment and possibly reduce the scope of real world T&E.

Simulation
A method for implementing a model(s) over time.

Simulation Support Plan (SSP)
Documents the implementation of SMART for systems and the planned use of M&S throughout the system's life cycle.

SSP Proponent
The SSP Proponent develops, maintains, implements and updates the SSP. The combat developer proponent member of the Integrated Concept Team is the SSP Proponent until a PM is appointed, at which time the PM becomes the SSP Proponent.

Simulator
See below for types of simulators:

a. A device, computer program, or system that performs a simulation. For training, a device that duplicates the essential features of a task situation and provides for direct practice.

b. For Distributed Simulation, a physical model or simulation of a weapons system, set of weapons systems, or piece of equipment that represents some major aspects of the equipment's operation.

Simulation and Modeling for Acquisition, Requirements and Training (SMART)
A change in Army business practices, through the exploitation of emerging M&S and other information age technologies, to ensure collaboration and synchronization of effort across the total life cycle of Army systems.

SMART planning guidelines (SPG)
Provides detailed guidance on implementing SMART and planning simulation support, and documenting both activities in an SSP.

Stimulator
See below for types of stimulators:

a. A hardware device that injects or radiates signals into the sensor system(s) of operational equipment to imitate the effects of platforms, munitions, and environment that are not physically present.

b. A battlefield entity consisting of hardware and/or software modules, which injects signals directly into the sensor systems of an actual battlefield entity to simulate other battlefield entities in the virtual battlefield.

Synthetic environment
Internet simulations that represent activities at a high level of realism from simulations of theaters of war to factories and manufacturing processes. These environments may be created within a single computer or on a distributed network connected by local and wide area networks and augmented by realistic special effects and accurate behavioral models. They allow visualization of and immersion into the environment being simulated.

Training, exercises, and military operations (TEMO) domain
One of the three domains for Army M&S applications. The TEMO domain includes most forms of training at echelons from individual simulation trainers through collective, combined arms, joint, and/or combined exercises. The TEMO includes mission rehearsals and evaluations of all phases of war plans. Analysis conducted during a rehearsal or evaluation validates the plan as well as the simulation environment will allow.

Validation
The process of determining the extent to which a model or simulation is an accurate representation of the real world from the perspective of the intended use of the model or simulation. Validation methods include expert consensus, comparison with historical results, comparison to test data, peer review, and independent review.

Verification
The process of determining that a model or simulation implementation accurately represents the developer's conceptual description and specifications. Verification evaluates the extent to which the models and simulations have been developed using sound and established software engineering techniques.

Section III
Special Abbreviations and Terms
This section contains no special terms.

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